UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/599,035	09/18/2006	Yasuo Kitaoka	10873.1950USWO	3284

53148 7590 01/07/2008

HAMRE, SCHUMANN, MUELLER & LARSON P.C.
P.O. BOX 2902-0902
MINNEAPOLIS, MN 55402

EXAMINER	
HITESHEW, FELISA CARLA	
ART UNIT	**PAPER NUMBER**
1792	
MAIL DATE	**DELIVERY MODE**
01/07/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/599,035	KITAOKA ET AL.	
	Examiner	Art Unit	
	Felisa C. Hiteshew	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-19 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-19 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date 09/18/2006.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

The PTOL 1449 of 09/18/2007 has been received, reviewed and considered.

Claim Rejections - 35 USC § 112

2. Claim 1 recites the limitation "...silicon carbide..." in line 2. There is insufficient antecedent basis for this limitation in the claim. Please insert the word -- a -- before the words "silicon carbide" for proper antecedence.

Claim 2 recites the limitation "...2H-SiC single crystal..." in 6. There is insufficient antecedent basis for this limitation in the claim. Please insert the word -- a-- before the phrase "...2H-SiC single crystal..." for proper antecedence. ***Claim Rejections - 35 USC***

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 6-8 are rejected under 35 U.S.C. 102(b) as being anticipated by U. S. Patent No. 4, 349, 407 (Lundberg).

Lundberg teaches a method of growing a single crystal of beta SiC from the liquid phase using molten lithium, a. well known alkali metal and alkali earth metal. The speed at which the crystals can be grown is dependent on the temperature of the

solution, between the ranges of 1330*C to about 1500*C). In a preferred embodiment, beta SiC single crystals are formed by holding an excess of polycrystalline SiC in contact with the molten lithium at a temperature at which SiC dissolves therein and maintaining the resultant solution at this temperature for a time sufficient for beta SiC single crystals of the desired size to precipitate therefrom (See col. 1, lines 62-68 and col. 2, lines 1-65).

5. Claim18 and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,718,760A (Carter, et al).

Carter, et al '760A teaches SiC single crystals of different polytypes (e.g. 2H, 6H,4H, 8H, 15R and 3C) (See col. 2, lines 14-19; lines 41-55; and col. 4, lines 3-8).***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8.

9. Claims 1-5, 9-13 and 17 rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 4, 349,407 (Lundberg) in view of U.S. Patent No. 3,053,635 (Shockley).

Lundberg teaches a method of growing a single crystal of beta SiC from the liquid phase using molten lithium, a. well known alkali metal and alkali earth metal. The speed at which the crystals can be grown is dependent on the temperature of the solution, between the ranges of 1330*C to about 1500*C). In a preferred embodiment, beta SiC single crystals are formed by holding an excess of polycrystalline SiC in contact with the molten lithium at a temperature at which SiC dissolves therein and maintaining the resultant solution at this temperature for a time sufficient for beta SiC single crystals of the desired size to precipitate therefrom (See col. 1, lines 62-68 and col. 2, lines 1-65).

The difference being that Lundberg does not exactly teach a method for producing a SiC single crystal, wherein silicon and carbon are dissolved in an alkali metal flux at different temperatures, a 2H-SiC or 3C-SiC single crystal, cooling the alkali metal flux, a carbon (graphite) based reaction vessel using a pressurized atmosphere.

Shockley teaches a molten metal or alloy in solution using carbon and silicon to form a liquid metal or alloy solvent. The concentration of carbon and silicon at a predetermined temperature for the concentration of silicon carbide is at saturation. A

small localized region of the solution is then cooled and supersaturated with silicon carbide which is precipitated in crystalline form from the solution. The temperature in the small region may be lowered by inserting a SiC seed crystal into the solution. The localized region adjacent the seed is supersaturated and SiC deposits on the seed in its crystalline form. The seed and crystal forming thereon may be continuously withdrawn from the solution as silicon and carbon to continuously be added to maintain the proper concentration of SiC in the solution. Preferably, a large temperature difference should exist between saturation and spontaneous nucleation of SiC in order to permit growth of a single crystal from a cooled zone within a graphite crucible (See col. 1, lines 43-72 and col. 2, lines 1-19). However, in the absence of unobvious results, it would have been obvious to one of ordinary skill in the art to determine through routine experimentation modifying and optimizing the process parameter teachings, as taught by Lungberg, with the similar and optimal process parameter teachings, as taught by Shockley in order to ensure proper orientation. The motivation being able to produce economically relatively large and homogeneous SiC single crystals of high purity.

U. S. Patent No. 3,669,763 (Perusek) is being cited for it's teaching of using argon as an inert gas during the production of SiC single crystals (See col. 2, lines 38-50.)

It is sufficient that the reference(s) clearly suggest doing what the applicant(s) have done. In re Gershon 152 USPQ 602.

2 step test for analogous art: 1) Decide if art is in the field of the inventors endeaver.

2) if not, determine if reference is reasonably pertinent to the particular problem with which the inventor was involved. *In re Deminski* 230 USPQ 313, 315 (Fed. Cir. 1986); *Stratoflex Inc. v. Aeroquip Corp.* 218 USPQ 871, 876 (CCPA 1983); *In re Wood* 202 USPQ 171, 174 (CCPA 1979).

A reference is good not only for what it teaches by direct anticipation but also for what one of ordinary skill might reasonably infer from the teachings. In re Opprect 12 USPQ 2d 1235, 1236 (CAFC 1989); In re Bode 193 USPQ 12; In re Lamberti 192 USPQ 278; In re Bozek 163 USPQ 545, 549 (CCPA 1969); In re Van Mater 144 USPQ 421; In re Jacoby 135 USPQ 317; In re LeGrice 133 USPQ 365; In re Preda 159 USPQ 342 (CCPA 1968).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Felisa Hiteshew whose telephone number is (571) 272-1463. The examiner can normally be reached on Mondays through Thursday from 5:30 AM to 4:00 PM with Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr, can be reached on (571) 272-1414. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-1463.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through

Private PAIR only. For more information about the PAIR system. see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866- 217-9197 (toll-free).

FELISA HITESHEW
PRIMARY EXAMINER
AU 1797